

GRAVITY DATA ANALYSIS AND FORWARD MODELING ALONG THE CHILEAN MARGIN AT 35-40°S

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Abstract: Crustal structures along the Chilean Margin at 35 – 40°S are subject to new geological and geophysical research. Gravity data base and the integrated active and passive seismological experiment ISSA 2000 Project provides new information about the structures along the 39°S profile, and other seismological measurements are recently being done in this particular area. Based on these constraining data, as well as other existing results such as reflection profiles and geological research, a preliminary 3D density model has been developed within the framework of the German Collaborative Research Center 267 Deformation Processes in the Andes (task group C6 and the MIGRA group).

The Southern Andes at this latitude are a very unique area in terms of a strong diversity of deformational style and therefore of geological structures as well. The oceanic lithosphere was generated in two different spreading centers at different time, and therefore there are varied buoyancy forces along this region. This is also the site, where the Chile ridge is actively being subducted, which has a certain effect on the development of the margin. The study region corresponds to the northernmost one-third of the rupture zone of the great Southern Chile earthquake in 1960. The analysis of the gravity field, by applying the Euler deconvolution method, curvature method, and other methods, which can show us the anomaly sources, and a preliminary 3D density model, should bring an insight into the crustal structures of this specific region. The gravity modeling indicates, and supports opinion, that the extensive back-arc volcanism east of the Main Cordillera between 38°-39°S implies active convection and influx of hot asthenospheric material into the mantle wedge below this region.

DATABASE

More than 2000 gravity stations were measured in Argentina along SALT (South American Lithospheric Transect) as a part of Migra 2000 field campaign in the previous period of this SFB. More than 60 000 stations were obtained from different sources, such as Geological Survey of Chile, oil industry enterprises, and other South American institutions.

The dataset obtained from YPF oil industry was analyzed and due to significant differences it was reprocessed as a part of Susann Wienecke's diploma work in our project. The YPF dataset was afterwards merged with our own measurements of Migra 2000 trip.

Another dataset from the area of Chile is under current evaluation due to the lack of meta-information.

The ship born gravity measurements were conducted in offshore areas in December 2001 as a part of SPOC (Subduction Processes Off Chile) marine project. This

dataset will be a part of our database, which will be used for the forward density modeling.

OUTLOOK

According to the first geological 2D models, a 2D density model was constructed along a seismic refraction profile at 39°S, which is a part of ISSA (Interdisciplinary Seismological Experiment in the Southern Andes), see figure below. This velocity model was used as constraining information for both – geometry and for density values of our model.

Using the additional information from the results of other projects and geological and geophysical research, we would like to develop a 3D density model in the area between 35 – 40°S and 75 – 68°W.

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